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# Power Function Review II

## Appendix

March 6, 2006



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# Power Function Review II

## Revenue Credits for Reactive Power & Voltage Control



# What are Ancillary Services?

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- Ancillary Services are needed with transmission service to maintain reliability within and among the Control Areas affected by transmission service.
- FERC Orders 888 & 889 established Ancillary Services and required transmission providers to include these services in their open access tariffs. Additionally, all integrated utilities were required to functionally unbundle to separate transmission from merchant functions.
- Reactive Power and Voltage Control is one of the six FERC defined Ancillary Services.
- BPA's Transmission Business Line provides these services to customers and relies on its merchant affiliate (Power Business Line) for the generation inputs.



# What is reactive power and why do we care?

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- Reactive power is supplied or absorbed by generators to maintain voltage and stability on the transmission grid. It contains many components: reactive capability, reactive energy, and responsiveness to interconnection operating systems. It is measured in voltamperes reactive or MVAR.
- Federal generators are available at all times to respond immediately and automatically to voltage deviations during the unforeseen events and are the backbone of voltage control. They provide high-speed dynamic response to changes in voltage that ensures grid reliability.
- Real power (the quantity that does useful work like spins motors, heats heaters, and lights the lights whereas reactive power is the quantity that maintains system voltage as it functions with the AC electrical system).
- Reactive power and real power work together to keep the transmission system reliable and efficient with regard to real power delivered to customers.



## What is inside the band and outside the band reactive power?

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- FERC has described inside the band as generation operations that produce reactive power. Individual generators have a set range of operations in which they can produce a certain amount of MVARS without significantly diminishing megawatt production. This range of operation is determined by a generator's design as indicated by its nameplate power factor rating. When the generator is operated inside this range, it is operating inside the band.
- However, if the generator is requested to produce more MVARS by reducing its real power (megawatt) production, this operation may be described as operating outside the band.
- FERC policy on reactive compensation is under development.



# What is the history of reactive power compensation to generators?

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- Beginning in 2002 TBL compensated PBL for generation supplied reactive based on an embedded cost methodology (includes FCRPS, real power losses, and synchronous condensing).
- In Order 2003A FERC recognized that if a transmission provider is paying its merchant for inside the band reactive power, non-affiliate generators interconnected to the transmission provider have rights to comparable compensation. Around the country multiple non-affiliate generators were quick to take advantage of this rule and filed reactive rates with FERC, including six generators interconnected with TBL (beginning with Centralia).
- FERC also stated that generators do not need to be compensated for inside the band operations, and these operations can be a requirement of all generators in order to be connected to the grid reliably. However, FERC is clear that outside the band operations do require compensation to generators.
- In 2005 Entergy filed with FERC for a declaratory order stating that if they no longer paid their merchant function for inside the band reactive, they would not be obligated to pay non-affiliate generators. FERC approved Entergy's filing and the case is currently in rehearing.



# What happens to regional benefits with increased reactive payments?

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- As more non-affiliated generators have filed for reactive rates, the BPA TBL ancillary service rates have increased and are expected to increase further once the settlement expires in FY07. Ancillary service rates are paid by both transmission and power customers (preference customers).
- BPA anticipates that current non-affiliated generators will file for increases in reactive payments and that more non-affiliated generators will file too.
- These reactive payments to non-affiliated generators have restructured the costs and benefits to all customers resulting in a net cost to the region.
- At some point, the benefits of the PBL being compensated for inside the band reactive power is outweighed by higher delivered power costs paid by all BPA customers.



## What impacts will reduced revenues have on customers over the rate period?

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- When TBL compensates PBL for within the band reactive, PBL treats this payment as a revenue credit which reduces the overall revenue requirement. Preference customers benefit through a reduction in PBL's cost-based rates. The cost of this reactive payment however is distributed to all customer groups through TBL's reactive power rate.
- Compensating non-affiliates for inside the band reactive increases the net cost to the region. Regional ratepayers experience no benefit from making reactive payments to non-affiliates through reduction in power purchase costs and must incur the cost of these reactive payments through increases in TBL's reactive rate.
- Non-affiliated generators however benefit from this arrangement since they receive reactive compensation from TBL and the majority of the cost of these reactive payments are absorbed by other customer groups.



# What impacts will reduced revenues have on customers over the rate period?

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- The expectation is that this change will initially slightly increase power rates (by approx. 0.18 mills spread proportionally to firm power energy rate and slice rate) but that transmission and ancillary service rates will decline since they will no longer include the high cost of purchasing inside the band reactive power.
- The most affected customer group is non-affiliated generators. BPA is currently paying about \$8 million per year for reactive power support to the transmission system.
- Investor-owned utilities are likely to be the second-most affected group because they have generation connected to the transmission system and could apply for reactive payments, but they also stand to realize the benefit of lower transmission rates.



# What's the next step for reactive credits to generators in the TBL Control Area?

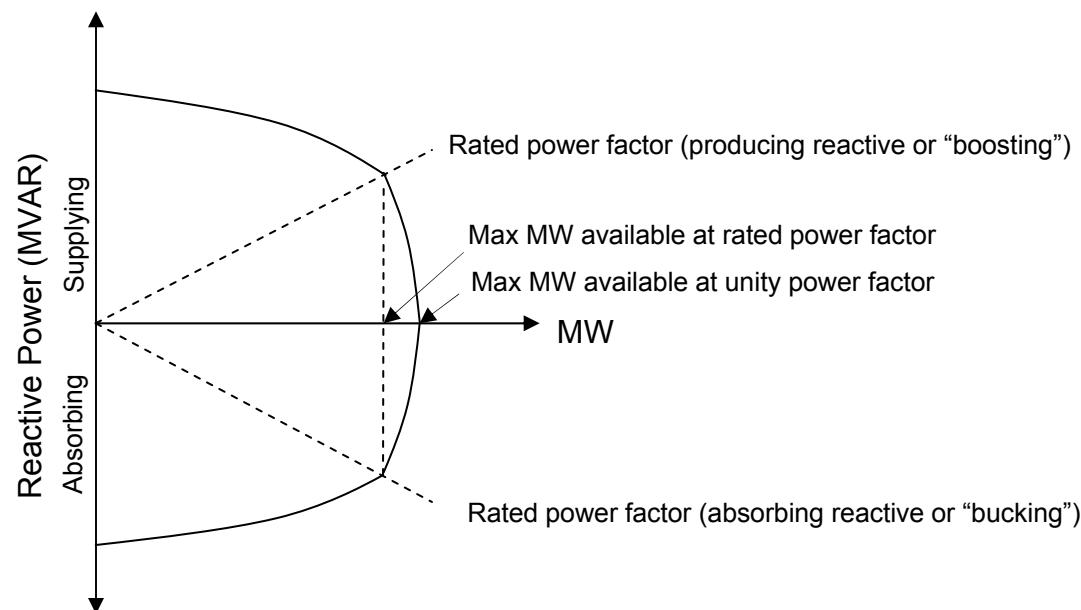
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- BPA believes this modification to the initial power proposal is warranted in light of recent FERC cases regarding generation input costs for reactive power and is a necessary first step to allow TBL to file at FERC to avoid paying non-affiliated generators for reactive power provided inside the band.
- Later this year TBL will begin its general rate case, which will set transmission and ancillary service rates for FY 2008-2009. That proceeding will include a separate joint BPA docket to determine outside the band compensation.
- Any future payments PBL may receive for outside the band reactive power would offset costs to preference customers and lower delivered power costs to all BPA customers.
- For more information, see BPA power rates and transmission websites.



# Generator Capability Curve – Synchronous Generator

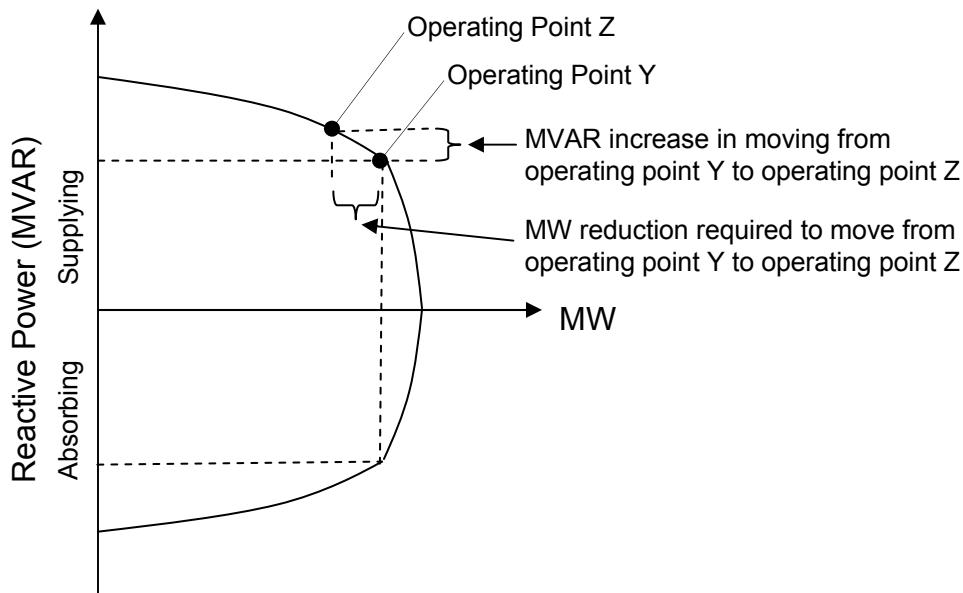
## ***Generator Capability Curve***





# Generator Capability Curve – Tradeoff of Real from Reactive Power

## ***Generator Capability Curve – The Tradeoff of Real for Reactive Power***



*Example of tradeoff between real and reactive power production at rated output.*



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# Power Function Review II

# RM&E



# Framework for Integrated ESA and F&W Program RM&E

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In PFR I last year we concluded:

- \$143M Fish & Wildlife Program Funding Level
- Allows for funding of more on-the-ground work (as identified by Subbasin Plan and ESA - BiOp priorities) through a more strategic and focused RM&E program



# What Are We Doing and Why?

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- Obtaining information needed to answer key management questions for planning, performance tracking, and adaptive management
- Required for ESA BiOps, Federal All-H Strategy, and F&W Program
- Federal Caucus RM&E Team developed a draft Framework and Plan in 2003 for FCRPS BiOP
- ISRP/ISAB and Regional Agency Reviews in 2004
- New 2004 BiOp – RM&E updated in Implementation Plan Strategies
- PNAMP, CSMEP, NED, Pilot Projects
- Integration of the draft Framework with F&W Program, Recovery Planning and other Regional Monitoring Programs



# The Evolving RM&E Framework

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- Standard Definitions for RM&E Projects
- Standard Design, Sampling, and Data Protocols
- Management Questions and Information Needs for Strategic Focus
- Responsibilities, Commitments, and Cost Sharing Agreements –Partnering with other Programs: USFS, EPA, States, etc.
- A Structure for Organizing Framework Components
- Using 2007–2009 Project Selection process tp review specific M&E components of projects



# Standard Definitions for RM&E Projects

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- Fish/Wildlife and Environmental Status and Trend Monitoring
- Action Effectiveness Research
- Uncertainties Research
- Project Implementation and Compliance Monitoring



# Management Questions and Information Needs

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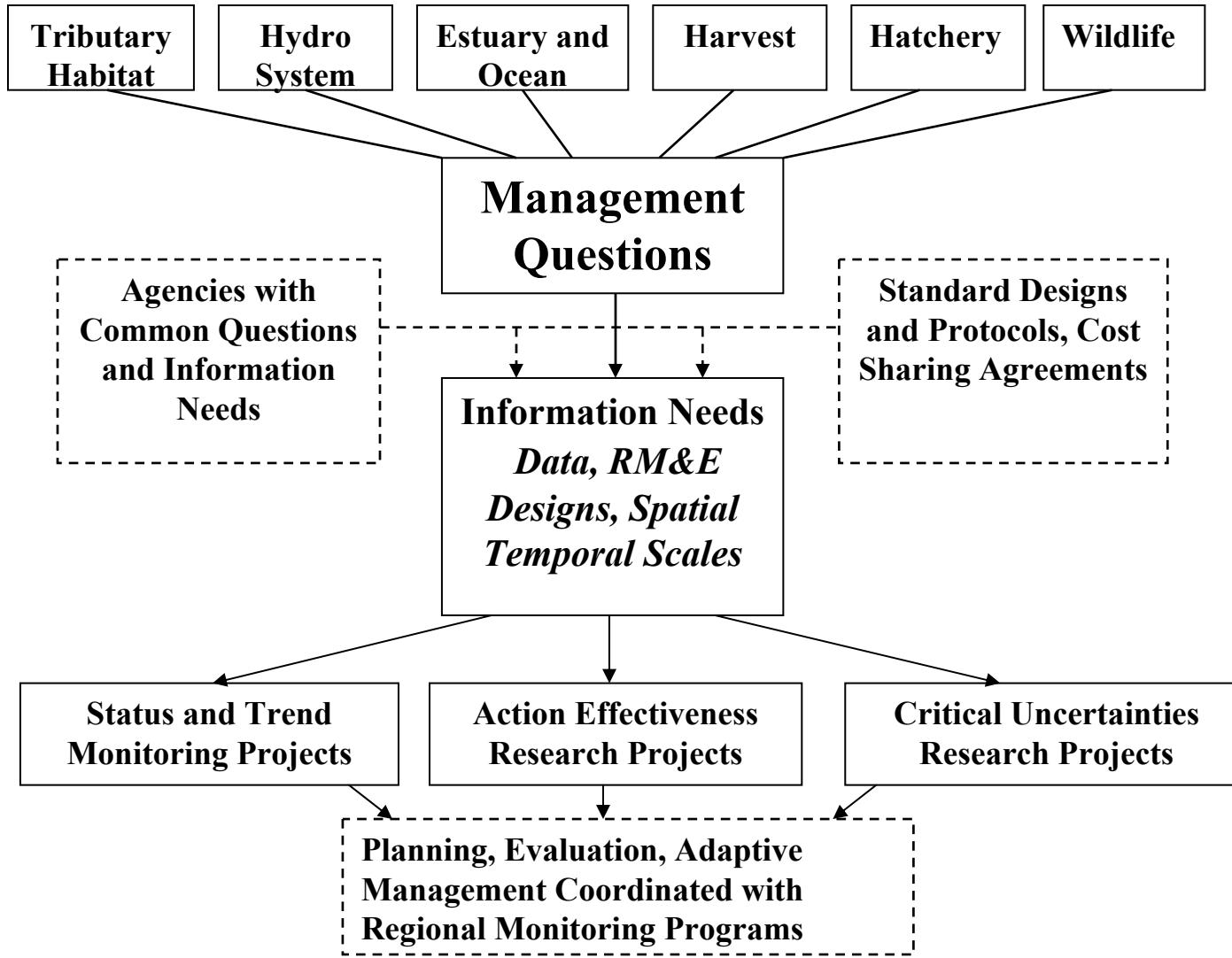
- Are we meeting biological and programmatic performance objectives?
- Where objectives are not being met, what factors are limiting our ability to achieve performance objectives?
- What mitigation actions are most effective at addressing these limiting factors?



# Cost Sharing

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- Regional information needs can only be obtained through cost sharing efforts and partnering with compatible monitoring programs
- Identify cost sharing responsibilities and commitments
- Seek cost sharing though project proposals and development of MOUs





RM&E Framework Components	Management Questions	Information Needs	Cost Sharing Agencies
<b>Tributary Habitat RM&amp;E</b>			
<i>Tributary Status and Trend Monitoring</i>			
<i>Tributary Action Effectiveness Research</i>			
<i>Tributary Uncertainties Research</i>			
<b>Hydrosystem RM&amp;E</b>			
<i>Hydrosystem Status and Trend Monitoring</i>			
<i>Hydrosystem Action Effectiveness Research</i>			
<i>Hydrosystem Uncertainties Research</i>			



# Where Are We In the Process?

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- Integrating Standards and Framework through the Council's Solicitation Process
- Council recently finalized their Regional Fish & Wildlife Program Research Plan
- Questionnaire on Management Questions and Monitoring Inventory
- Federal Caucus Group on Federal Responsibilities
- Recovery Planning Framework Consistency
- PNAMP, NED, CSMEP, and Pilot Projects
- BiOp Remand Process includes development of a RM&E Framework
- Updating the 2003 Federal RME Plan in 2006



# Policy Level Input?

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- Additional Confirmation of the Framework and Components
- Policy Commitments to Implementation of Standardized Approaches and Integrated Regional Network of RME Programs
- Resolution of Needs, Responsibilities, and Commitments for different RM&E